

ON A DIBRANCHIATE CEPHALOPOD, *STYRACOTEUTHIS*  
*ORIENTALIS*, N.GEN. & N.SP., FROM THE EOCENE OF ARABIA.

By G. C. CRICK, F.G.S.

*Read 10th March, 1905.*

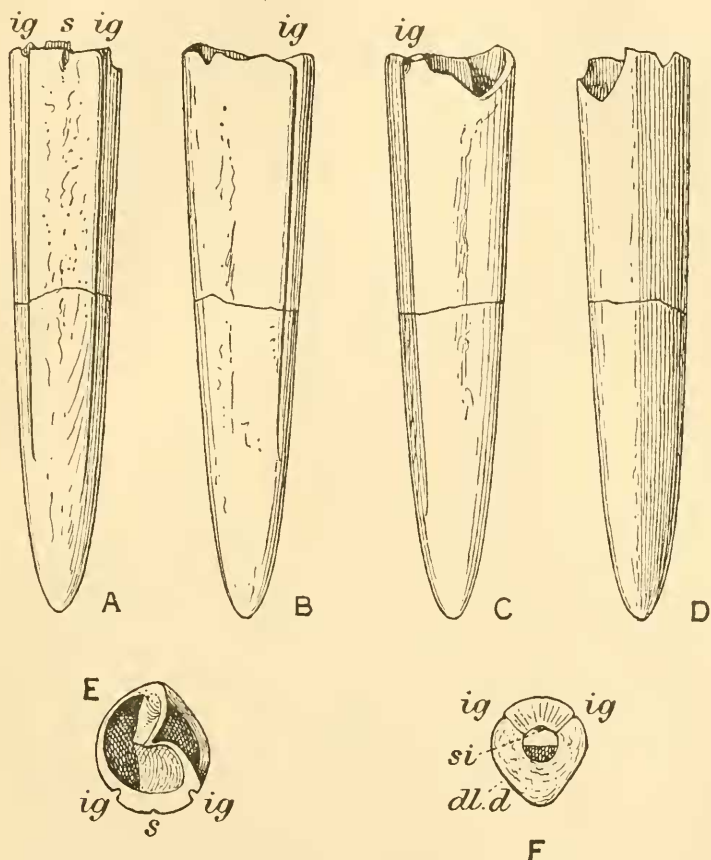
THE specimen described in the present paper formed part of a series of fossils,<sup>1</sup> consisting chiefly of the casts of Gastropoda, collected by Lieut.-Colonel Dr. A. S. G. Jayakar from the Eocene beds at Ras Ghissa and Sharkeeyab in Oman, Arabia, and presented by him to the British Museum. This fossil was obtained at Sharkeeyab, and is preserved in a fawn-coloured marly limestone. From the character of the fossils with which it was associated there seems to be no doubt as to its geological age.

The specimen is belemnitiform, 74 mm. long, conical, gradually tapering for about three-fourths of its length, the apical portion tapering rather more quickly, and terminating in a somewhat obtuse point. It is a little compressed, its ventro-dorsal and transverse diameters, at the anterior end, being 17 and 15 mm. respectively. Its transverse section is oval or subtriangular, the siphuncular or ventral side<sup>2</sup> corresponding to the base of the triangle. At the anterior end of the specimen the alveolar cavity is displayed, the guard being thickest on the ventral side. One side of the anterior part of the cavity is pushed inwards and broken (see Fig. E). On each side of the median portion of the dorsal area, the guard, for two-thirds of its length, is a little flattened, or even slightly concave. Symmetrically placed on the ventral surface, and 9 mm. apart, are two strong sharply-incised grooves, which pass backwards from the edge of the alveolus, where they are about 1 mm. wide, for a distance of 55 mm. and 47 mm. respectively, when each gradually dies away. In a ventral aspect of the guard, the one on the left, i.e. the longer of the two, turns towards the middle of the ventral surface as it is disappearing; that on the right gives off, throughout the lower half of its course, branches which also pass on to the ventral surface. A transverse section of the guard, at about its mid-length (see Fig. F), shows that a crack extends from the bottom of each groove to the boundary of the phragmocone, the crack being filled with a material of a dark reddish-brown colour. The internal portion of the guard between these two cracks is traversed by a number of small similarly coloured and radially disposed cracks, but these, excepting perhaps the median one, only extend part of the way between the

<sup>1</sup> This collection of fossils is mentioned by Mr. R. B. Newton, *Quart. Journ. Geol. Soc.*, vol. lxi (1905), p. 158. For details of the geology, see H. J. Carter, "Memoir on the Geology of the South-East Coast of Arabia" [reprinted with alterations and additions from the *Journ. Bombay R. Asiatic Soc.*, 1852, vol. iv], *Geological Papers on Western India*, etc. (1857), pp. 551-627.

<sup>2</sup> As in *Belemnites*, the side on which the siphuncle is situated is here called ventral.

phragmocone and the surface of the guard. At the anterior part of the specimen, and midway between the two longitudinal grooves, there is a small triangular indentation, which may be the posterior



*Styracoteuthis orientalis*. A, ventral aspect; B, right lateral aspect; C, left lateral aspect; D, dorsal aspect; E, anterior view of alveolar end; F, natural transverse section of guard, being the posterior view of the anterior half of the specimen. Eocene: Sharkeyab, Oman, Arabia. Drawn of the natural size from the type-specimen in the British Museum (Natural History). [C. 8010.]

*ig.* incised groove.

*s.* indentation at middle of anterior end of ventral surface.

*si.* siphuncle.

*dl.d.* dorso-lateral depression.

termination of another groove that was continued forwards over a portion of the alveolar cavity that is not now preserved. The surface of the specimen is roughened, having in places, especially at

the anterior part, quite the appearance of shagreen; it is also very foliaceous, as though the outer concentric layers of the guard were loosely superimposed. This is especially the case on the ventral surface between the two longitudinal grooves and on the dorsal surface. The internal structure of the guard is coarsely crystalline, and does not at all distinctly show the concentric lamellæ, such as are so conspicuous in the *Belemnite* rostrum. The phragmocone extends through about three-fourths of the length of the specimen; its section is almost circular; its sides are inclined to each other at an angle of  $13^{\circ}$ , the angle between the dorsal and ventral surfaces being  $12^{\circ}$ . The septa, as seen at a fracture at about the middle of the specimen, are oblique, their lowest part being on the siphuncular side, i.e., on the side adjacent to the two longitudinal grooves, and they have only a very slight ventral lobe.

The affinities of the fossil are quite clear. It is allied, on the one hand, to the genus *Bayanoteuthis* from the Eocene of Ronca and of the Paris Basin; and, on the other hand, to the genus *Vasseurina* from the Eocene of France.

The genus *Bayanoteuthis* was instituted by Munier-Chalmas<sup>1</sup> for a species (which he did not name) from the "sables de Beauchamp" (Upper Eocene) at Bremier, and for the species from the Eocene of Ronca that was described and figured by U. Schlönbach under the name *Belemnites rugifer*.<sup>2</sup> Munier-Chalmas did not give a detailed diagnosis of the genus, of which only a few fragments are known, but merely stated that it differed from true *Belemnites* by the possession of two sublateral grooves, and by the oval section of its narrower and more elongate phragmocone. But U. Schlönbach's figures and descriptions of his species, *B. rugifer*, are quite sufficient to indicate the characters of the genus. However, a diagnosis of the genus was subsequently given by M. Paul Fischer<sup>3</sup> and afterwards by Zittel.<sup>4</sup> In this genus the guard is elongated, subcylindrical, terminated posteriorly in a point, and bearing two longitudinal, broad, shallow, smooth, lateral grooves; the dorsal surface is ornamented with longitudinal coarse impressions; the alveolus is unusually deep; the phragmocone is narrow, very slender, long, and in cross-section oval; the siphuncle is ventral; and the septa, according to M. Fischer, possess a feeble siphonal lobe.

The present specimen differs from this genus in several important characters: firstly, by the more conical form of the guard; secondly, by the presence of the deeply incised groove on each side of the ventral surface; and thirdly, by the more nearly dorsal position of the broad shallow dorso-lateral grooves.

The genus *Vasseurina* was instituted in 1880 by Munier-Chalmas,<sup>5</sup>

<sup>1</sup> Bull. Soc. géol. France, sér. II, vol. xxix (1872), p. 530.

<sup>2</sup> Jahrb. d. k.k. geol. Reichsanst., Wien, Bd. xviii (1868), pp. 455-461, pl. xi, figs. 1a-h.

<sup>3</sup> "Manuel de Conchyliologie," fasc. iv (1882), p. 360.

<sup>4</sup> "Handbuch der Paläontologie," Bd. i, Abth. 2 (1884), p. 509.

<sup>5</sup> Bull. Soc. géol. France, sér. III, vol. viii (1880), p. 291.

but he did not figure the genus. The type-, and the only known species (*V. occidentalis*, from the Eocene of Brittany) was subsequently figured by Vasseur<sup>1</sup> (pl. i, figs. 8–15) in an incomplete work issued in 1881,<sup>2</sup> by M. Paul Fischer in 1882,<sup>3</sup> by M. Cossmann in 1895,<sup>4</sup> and by MM. Cossmann & Pissaro in 1900.<sup>5</sup> In this genus the guard is small, conical, narrow, having the form of *Dentalium*, and is straight, or very feebly curved; its external surface is ornamented with a number of longitudinal grooves; the phragmocone is more than one half the length of the guard and has an elliptical cross-section; the septa are oblique, directed backwards towards the siphuncular side, and provided with a subangular siphonal lobe; the septal necks extend from one septum to another. The type-species is described by Munier-Chalmas as having from 8 to 10 longitudinal grooves, with other secondary ones interpolated between them. Zittel, however, in his definition of the genus ("Handbuch der Paläontologie," Bd. i, Abth. 2, Lief. iii, 1884, p. 509) states that the shell was ornamented with *three* longitudinal furrows extending from the apex ("mit 3 von der Spitze ausgehenden Längsfurchen"), a statement which is repeated in the first (1895, p. 442) and second (1903, p. 476) editions of his "Grundzüge der Paläontologie." The statement is not borne out by any of the examples that the present writer has examined; they all possess considerably more than three rather deep grooves which extend from the apex and disappear towards the anterior part of the guard, whilst between these are interpolated finer grooves which anteriorly are entirely replaced by small irregular depressions, giving to the surface of the guard the appearance of shagreen.

The Arabian specimen is much larger than this genus; its two longitudinal grooves are deepest at the alveolar margin, and do not extend to the posterior extremity, whereas in *Vasseuria* the longitudinal grooves extend from the apex and die out on the alveolar region; *Vasseuria* also does not possess any dorso-lateral depressions.

While having affinities with both *Bayanoteuthis* and *Vasseuria*, the present specimen may also be compared with the Upper Cretaceous genus *Belemnitella*, d'Orbigny.<sup>6</sup> Well-preserved examples of *Belemnitella mucronata*<sup>7</sup> possess, on each side, a double dorso-lateral groove,

<sup>1</sup> "Recherches géologiques sur les terrains tertiaires de la France occidentale." Paléontologie par G. Vasseur. Atlas: pls. i–iii and v–xi. Cossmann states that he possesses also plates iv and xix.

<sup>2</sup> M. Cossmann: Bull. Soc. Sci. Nat. de l'ouest de la France, tom. v (1895), p. 159, footnote 2 (= "Mollusques éocéniques de la Loire-inférieure," tom. i, fasc. 1, p. 3, footnote 2).

<sup>3</sup> "Manuel de Conchyliologie," fasc. iv (1882), p. 359, fig. 137.

<sup>4</sup> Bull. Soc. Sci. Nat. de l'ouest de la France, tom. v (1895), p. 167, pl. v, figs. 10–13 (= "Mollusques éocéniques de la Loire-inférieure," tom. i, fasc. 1, 1895, p. 11, pl. i, figs. 10–13).

<sup>5</sup> Bull. Soc. géol. Normandie, tom. xix (1898–1899), p. 21, pl. i, fig. 23 (1900).

<sup>6</sup> D'Orbigny: Pal. Franç., Terr. crét., tom. i, Céph., 1840–42, p. 59.

<sup>7</sup> See D'Orbigny, op. cit., pl. vii, figs. 1–3; C. Schlüter, Paläontographica, Bd. xxiv, pl. iv, figs. 1a, b, c; and D. Sharpe, Foss. Moll. Chalk (Mou. Pal. Soc.), pt. i (1853), pl. i, figs. 2a, b (the dorso-lateral grooves are indicated in these figures, but the vascular impressions are very imperfectly indicated in fig. 2b).

in which the groove adjacent to the dorsal area is much broader than the other, and anteriorly approaches its fellow on the opposite side, imparting to the alveolar region of the guard a subtriangular cross-section. The other groove on each side, i.e. the groove nearer the middle of the lateral area, is much narrower, and from it originate the vascular impressions which pass on to the ventral surface of the guard, where they form a very conspicuous character.

In the present specimen each dorso-lateral depression appears, then, to be comparable with the more dorsal member of each double dorso-lateral groove in the genus *Belemnitella*, whilst the incised grooves bounding the ventral surface appear to be comparable with the more nearly lateral component of each dorso-lateral groove in the same genus. The presence or absence of a ventral slit in this specimen is not determinable, owing to the imperfection of the anterior portion of the alveolar region; if a slit existed it was comparatively short, but the slight indentation (referred to above) in the middle of the ventral surface at the anterior end of the specimen the writer is disposed to regard as accidental.

The specimen appears, then, to be generically distinct, and, whilst being most nearly related to such Eocene forms as *Bayanoteuthis*, and especially to *Vasseuria*, forms a connecting link between these genera and the Cretaceous genus *Belemnitella*. Although only a single example is known, the form is so important that the writer proposes for it the name *Styracoteuthis*,<sup>1</sup> and, for its trivial designation, suggests the term *orientalis*.

---

<sup>1</sup> στύραξ, ακοσ, spike at lower end of spear.